Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Mott's scattering and Spin Hall Effect modeled by means of numerical solutions of the Schrödinger equation NAGENDRA DHAKAL, MIKHAIL EREMENTEHOUK, MICHAEL LEUENBERGER, University of Central Florida — We have developed a code for numerical solution of non-stationary Schrödinger equations based on the finite difference time-domain (FDTD) method. We model the 2 dimensional free electron gas system using perfectly matched layers for the open surrounding space. We study the effect of localized impurities on the time evolution of the electron wave function, thereby observing dephasing introduced by the impurities. Our numerical simulations show the de-coherence due to the impurities at moderate impurity densities and Anderson localization at high impurity densities. We implement the code for studying an effect of the spin orbit interaction in presence of the impurities. The clear picture of Mott's scattering gives rise to the Spin Hall Effect. Our results are important for the implementation of quantum computing, quantum communication, and spintronics.

Nagendra Dhakal
University of Central Florida

Date submitted: 20 Nov 2012 Electronic form version 1.4